REVIEWS.

ART. XVIII.—*The Diseases of the Sympathetic Nervous System.*

1. *Physiology and Pathology of the Sympathetic System of Nerves.* By Dr. A. EULENBURG, Professor of Medicine, University of Griefswald, and Dr. P. GUTTMANN, Privat. Docent, Univ. of Berlin. Translated by A. NAPIER, M.D., Glasgow. Journal of Mental Science for July and October, 1878, and January, 1879.
2. *Pathologie Clinique du Grand Sympathique. Étude basée sur l'Anatomie et la Physiologie.* Par le Dr. A. TRUMET DE FONTARCE, Ancien Interne des Hôpitaux de Paris, etc. etc. Paris: Libraire J. B. Baillière et Fils, 1880.
   Clinical Pathology of the Great Sympathetic. A study based upon its Anatomy and Physiology. By Dr. A. TRUMET DE FONTARCE.

As in law, rights founded in fraud become through time and change inalienable, so in science, terms born of ignorance become at length so rooted in language that they cannot be displaced. The expression "sympathetic nervous system" is an illustration of this fact. "Sympathetic," as here used, is a word without definite meaning; and the organs and structures referred to do not come up fully to the anatomico-physiological idea of a "system"—an assemblage of parts composed of the same tissues, intended for similar functions, and independent in action. We shall not, however, hesitate to make use of these terms in the present article, knowing that we cannot be misunderstood.

As a frontispiece, Trumet de Fontarce presents us with an excellent schematic plate of the "great sympathetic." It enables us at a glance to trace the spinal, visceral, and mutual relations of the numerous ganglia and plexuses. A recapitulation of the chief anatomical facts in regard to the sympathetic will not, we believe, for most of our readers be a service unappreciated.

On each side of the anterior aspect of the spinal column, in neck, chest, abdomen, and pelvis, is a chain of ganglia, united by a longitudinal cord, constituting what is sometimes termed the vertebral portion of the sympathetic, the nervus intercostalis of the old anatomists. The cervical ganglia are on each side, three in number, of large size; the thoracic twelve, the lumbar four.

Within the cranium are several well-known ganglia—the ophthalmic, lenticular, or ciliary ganglion within the orbit; the spheno-palatine or Meckel's in the spheno-maxillary fossa; the otic or Arnold's, which lies against the inner surface of the inferior maxillary nerve close to the foramen ovale; and the submaxillary on the submaxillary gland. All these ganglia have branches of communication with the cranial nerves.

The carotid plexus is supposed to be the centre of communication between the cranial ganglia, and also to connect these with the vertebral chain. It is formed from the ascending branch of the superior cervical ganglion, whose branches wind around the internal carotid artery. A branch from the Vidian nerve also comes to the plexus.

According to Ludovic Hirschfeld, the ganglia of the head do not belong to the sympathetic; but it is enough for us to know that the cranial prolongation of the superior cervical ganglion has anatomical connections with the cranial nerves, ganglia, and plexuses. Although, in the present state of our knowledge, it will be rather a pleasing fancy than a useful fact, we may, if we choose, suppose a circle or circuit to be completed by the vertebral and cranial sympathetic, the connection below being made through the *ganglion impar*, on the first bone of the coccyx, and above through the ganglion of Ribes, on the anterior communicating artery.

On or near the great viscera of the chest, abdomen, and pelvis is another series of ganglia and plexuses, called sometimes the prevertebral portion of the sympathetic. Its chief subdivisions, from above downwards, are the cardiac, solar, and hypogastric plexuses. Besides these, however, numerous secondary plexuses are found—the pharyngeal, laryngeal, pulmonary, coronary, splenic, supra-renal, renal, mesenteric, ovarian, vaginal, vesical, etc. These are connected by numerous branches with the vertebral ganglia and with the cerebro-spinal axis. We will, however, only call up a few of the more important of these communications. Superior, middle, and inferior cardiac nerves pass from the cervical ganglia to the cardiac plexuses. The vastly important splanchnic nerves are formed from the visceral branches of the six lower thoracic ganglia.

By some authorities the ganglia situated upon the posterior roots of the spinal nerves have been regarded as belonging to the sympathetic system.

It is most important to remember that the sympathetic system of nerves and ganglia is connected anatomically with the cerebro-spinal axis. The central communications of these two departments of the nervous system are those which are best understood. In the thoracic and abdominal regions these have been best studied; but probably similar connections exist between all parts. *Rami communicantes*, or communicating branches, pass between the spinal nerves and the ganglia which constitute the vertebral chain or trunk. Kesteven, in a short article, entitled "The Sympathetic Centre" (*Brain*, October, 1878), has stated succinctly the facts in regard to the connections between the cerebro-spinal and sympathetic divisions of the nervous system. He divides them broadly into two classes, *central* and *peripheral*, the central being by the rami communicantes, to which we have just referred. The peripheral are those which exist between the various nerves passing from either centre. At no place, according to him, does real union take place between the systems without the interposition of nerve corpuscles.

> "The nerve fibrils may run together, that is, in the same direction, but they are never actually united unless the nerve corpuscles intervene. Such intervention of corpuscles gives rise to secondary ganglionic formations. These formations may vary, in accordance with the number of nerve fibres which have to be united. The otic and submaxillary ganglia are instances of small ganglionic formations; but where this coalescence takes place in the neighbourhood of some large viscus the ganglionic formation is more complex, and has received the name of plexus."

Kesteven also states that the peripheral connections between the sympathetic and cerebro-spinal systems are important and universal. He expresses himself as follows:—

> "There is not throughout the body a single sympathetic nerve fibre which reaches its destination without previous admixture or fusion to a certain extent

with nerve fibres from the cerebro-spinal system. This fusion or admixture is brought about by the various ganglia and plexuses which are scattered throughout the body."

Although these statements have not been thoroughly proved, yet much physiological and pathological evidence would seem to support them, and we introduce them here because we wish forcibly to emphasize the interdependence of all parts of the nervous system.

Napier's translation of the essay of Eulenburg and Guttmann appeared first in the English *Journal of Mental Science* for July and October, 1878, and January, 1879, and has quite recently been published in book-form. The translator, in a foot-note, informs us that it was for this essay that the Astley Cooper Prize for 1877 was originally awarded to Drs. Eulenburg and Guttmann—a decision, however, which was subsequently overthrown on the technical ground that the paper was the work of *two* authors and not of one only, as the terms of Sir A. Cooper's will seem to require. That the essay was worthy of the prize no one that becomes familiar with it can for a moment doubt. Both as regards the original work done, and the study of literature made, it is a masterly performance.

Part I. of the essay treats of the physiology of the subject, and Part II. of its pathology. Under the head of Physiology we have discussed (1) the cervical sympathetic, and (2) the thoracic and abdominal parts of the sympathetic system; under Pathology various symptoms, lesions, and diseases are brought forward, but these we will hereafter present in detail.

We will first pass quickly in review the most important observations on the physiology of the cervical sympathetic as they are presented by Eulenburg and Guttmann.

Pourfour du Petit showed that the cervical sympathetic had some control over the movements of the pupil; a fact re-discovered by Biffi, in 1846, who found that division of the nerve caused contraction of the pupil, irritation of its peripheral end, dilatation. Budge and Valentin demonstrated further that the pupil thus made to contract, can be again slightly dilated by mydriatics, such as atropia. The usual explanation of these observations is that they are brought about by branches of the cervical sympathetic, which supply the dilator muscle of the pupil. Budge pointed out that these fibres issued from the spinal cord, in the region called the inferior cilio-spinal centre, between the sixth cervical and seventh dorsal nerves. Claude Bernard placed an oculo-pupillary centre, at the level of the first and second dorsal vertebræ. According to Salkowski, the cilio-spinal centre must be above the atlas; Eulenburg and Guttmann concluded that the zone of the spinal marrow, the wounding of which has an influence on the sympathetic pupillary branches, does not extend below the second dorsal vertebra; but at present its upper boundary cannot be specified with certainty. Budge accepts a cilio-spinal centre connected with the hypoglossus by a communicating filament. Budge and Claude Bernard have shown that the connection between the inferior ciliospinal centre and the sympathetic takes place through the communicating branches of the anterior spinal roots. Salkowski holds that the oculopupillary and vaso-motor filaments are the same. Claude Bernard called attention to the fact that contraction of the pupil after division of the sympathetic is constantly accompanied by retraction of the globe of the eye, flattening of the cornea, and decrease in the size of the palpebral fissure. The same phenomena he saw also after division of the anterior roots of the two first dorsal nerves and after section of the spinal marrow at the level of the first and second dorsal vertebræ. Irritation of the divided sympathetic, or of the peripheral ends of the severed anterior roots, gave opposite results—prominence of the globe, bulging of the cornea and enlargement of the palpebral fissure.

H. Müller has discovered orbital muscles, which have their nerve supply from the sympathetic, and which act to throw the eye forward. Sappey has described similar muscles in the orbital aponeuroses.

Some physiologists, as Romberg, Remak, and Schiff, ascribe to the cervical sympathetic a tonic influence on the voluntary muscles of the eye.

Claude Bernard, Schiff, Eulenburg and Guttmann, and others, have shown that division of the cervical sympathetic produces dilatation of the vessels of the head and neck, and a considerable elevation of temperature, of the side operated on. According to Bernard, these results were due to increased flow of blood to the parts because of vaso-motor paralysis; lowering of temperature, on the other hand, being the result of contraction of the vessels, in consequence of irritation of the divided cervical sympathetic.

Goltz's view is as important as it is revolutionary. According to this authority, dilatation of bloodvessels, elevation of temperature, etc., are due to an active process, to stimulation of vaso-dilator nerves. An acceptation of these views must change considerably our ideas in regard to some vaso-motor disorders. Goltz would explain the fundamental experiment of Bernard, which showed that division of the sympathetic caused dilatation of the vessels of the head and elevation of temperature on the injured side, by the persistent irritation of vessel-dilating nerves caused by the incision. Eulenburg and Guttmann repeated the fundamental experiments on the cervical sympathetic, with special view to determining the question whether the vaso-motor nerves are, or are not, vaso-dilator in character. They took certain precautions and adopted certain methods not used by former experimenters. In their investigations on the cervical sympathetic they abandoned the ordinary thermometer and used exclusively a thermo-electric apparatus. Their experiments, both on the cervical sympathetic and on the sciatic nerve, led them to decide against the opinions of Goltz and his followers in regard to the existence of vaso-dilator, and in favour of the usual older view of vessel-contracting nerves.

They call in question the conclusions of Brown-Séquard, according to which, *irritation* of the surface of the brain produced the appearance of paralysis of the same side. It will be remembered by those familiar with the literature of vaso-motor research, although the investigations are not here specifically referred to, that Eulenburg and Landois (*Centralbl. f. Med.*, 1876, p. 166), and Hitzig (*Ib.*, p. 323), performed experiments which seemed to indicate the existence, in the motor zone of the cortex, of heat-controlling centres, vaso-motor or special, destruction of which caused elevation and irritation, lowering of temperature in the opposite extremities. When discussing the vaso-motor branches of the cervical sympathetic, although they admit in another place the indecisive results of their own experiments, Eulenburg and Guttmann assert their belief not only in a great vaso-motor centre in the medulla oblongata, but also in localizable districts on the brain surface, in which it is not improbable that the sympathetic vaso-motor branches terminate. Why should not vaso-motor acts be under the control of the brain as certainly as the gross movements of the limbs and face?

Under the head of vaso-motor branches of special organs, we have a *résumé* of investigations by Wegner, Adamück, Grünhagen, Hippel and Grünhagen, and Sinitzin on intraocular pressure; by Donders and Callenfels, Nothnagel, Schultz, Riegel and Jolly, and Fischer, on intracranial pressure in connection with vaso-motor branches of the brain and its membranes; by Prussak on the vaso-motor branches of the ear; by Claude Bernard, Ludwig, Pflüger, Heidenhain, Prevost, Vulpian, Herzenstein, Wolferz, Demtschentko, Valentin, Reid, Volkmann, Brown-Séquard, and others on vaso-motor branches concerned with secretion and nutrition, or according to the position taken, on special secretory and trophic nerve-fibres.

We will only have space to refer to a few of these important investigations. The following paragraph embodies the views of the authors in regard to the vaso-motor branches of the eye:—

> "Irritation of the cervical sympathetic sets two apparatuses in action, which, in relation to the intraocular pressure, so oppose each other that, according as the energy of the one or of the other preponderates, increase or diminution of the pressure follows. The one apparatus, the vaso-motor, lessens the pressure; the second, situated apparently in the internal muscles of the eye (in the accommodation apparatus), augments the pressure."

On the whole, the weight of published testimony, as here presented, would seem to indicate that the cervical sympathetic was connected with the innervation of the cerebral bloodvessels, and hence its irritation or division would have an effect on intracranial pressure.

Prussak has proved that the vessels of the cavity of the tympanum become dilated after division of the cervical sympathetic of the same side.

Although we have no statement of opinion from them, the evidence presented by Eulenburg and Guttmann would seem to favour the view of the existence of special secretory and trophic fibres, independent of true vaso-motor fibres. We will give a few of the facts. The secretion caused by irritating the nerves can be produced in glands which have no circulation. Pflüger discovered that certain nerve-fibres terminate directly in the cells of the gland. Heidenhain has proved that stimulation of the nerves of secretion, especially of those cerebro-spinal glandular nerves which excite a very fluid secretion, leads to a change of the protoplasmic cells into mucus-cells (by mucus metamorphosis of the cell contents), and to further division of the newly-formed cells.

It is supposed by some that in the cervical sympathetic are included certain nerve-fibres which convey influences which *accelerate the heart's action.* V. Bezold particularly has advocated an excito-motor apparatus of this kind.

Lepine, with Bochefontaine and Triden, have found that irritation of certain spots on the surface of the brain gave rise, among other phenomena, to *acceleration of the heart's beat.* Eulenburg and Guttmann, however, instead of arguing from this, with v. Bezold, for the existence of a cerebral centre for the cardiac accelerating branches of the sympathetic nerve, hold that it is more probable that we have to do rather with simple cortical vaso-motor centres, the acceleration of the heart's action following irritation of these being regarded only as the result of the increase of the arterial pressure.

The experimental observations on the functions of the cervical sympathetic nerve in man, although interesting, are not very convincing. They have an important bearing on some practical electro-therapeutical problems, beside their interest in physiology. They were principally conducted on living men by percutaneous faradization, or galvanization of the cervical sympathetic. It is almost impossible to say that the sympathetic has been isolated by such a method.

A few observations are recorded of the effect of direct electrical irritation of the exposed cervical sympathetic in executed criminals. These, in general, support the physiologists.

Compared with the fulness of their exposition of the facts pertaining to the cervical sympathetic, the space devoted by Eulenburg and Guttmann to the physiology of the thoracic and abdominal parts of the sympathetic is limited. We will quote their general statement of this portion of their subject.

> "According to their physiological functions, so far as we know them, we can distinguish the following varieties of branches in the thoracic and abdominal sympathetic nerves:—
>
> 1. Excito-motor branches of the thoracic and abdominal viscera.
> 2. Movement-controlling (regulating) branches.
> 3. Vaso-motor (or secretory and trophic) branches.
> 4. Sensory branches, acting reflexly."

According to Budge, Donders, and v. Bezold, the trunk of the sympathetic in its whole length, as far downwards as the lumbar region, contains fibres, the irritation of which accelerates and strengthens the contractions of the heart. Nothing is certainly known regarding the influence of the sympathetic in movements of the stomach; but the peristaltic movement of the intestines, though automatically excited through the parenchymal ganglia, seem capable of receiving accelerating influences from the thoracic and abdominal sympathetic.

Movement-controlling branches are of two kinds: (*a*) the direct inhibitory, and (*b*) those which act reflexly, or reflex inhibitory nerves. The splanchnic is generally considered a direct inhibitory nerve; but as it is also the vaso-motor nerve of the small intestine, the lessening of arterial blood supply following its irritation, might be regarded as indirectly the cause of the decrease or arrest of the peristaltic action which results. Goltz, by striking the skin of the abdomen, or exposed abdominal viscera of frogs, produced temporary diastolic arrest of the heart's action, and hyperæmic dilatation of the vessels of the abdomen—reflex inhibitory effects.

Eulenburg and Guttmann conclude that the vaso-motor or secretory and trophic branches of the thoracic and abdominal viscera are distributed for the most part, if not entirely, by the sympathetic—the plexuses and peripheral branches of the thoracic and abdominal portions.

Brown-Séquard concluded after experiments that the vaso-motor nerves of the lungs are not distributed in the vagus, but through the cervical portion of the spinal cord and the first thoracic ganglion of the sympathetic. Bischofswerder concluded that the vagus as well as the sympathetic, acts as a vaso-motor nerve of the lung. According to Brown-Séquard the vaso-motor nerves of the lungs appear to have a cerebral origin. He repeatedly saw pneumonic infiltration, hemorrhages, and œdema of the lungs, after injury to the base of the brain. Nothnagel made the same observations after injury to a certain spot on the surface of the rabbit's brain; sometimes nearly the whole lung was infiltrated with blood.

The splanchnic is the principal vaso-motor nerve of the body. Its centre appears to be in the brain.

On the whole, after a full presentation of the facts, Eulenburg and Guttmann conclude that experiment supports the view that the vaso-motor or secretory nerves of kidneys and liver have separate cerebral centres.

The fact of the existence or non-existence of sensory or afferent fibres in the sympathetic is one that has some bearing upon the question of the independent action of the sympathetic. If it could be shown that sensory filaments from the extremities or the viscera, or both, passed through the sympathetic trunks and terminated in sympathetic ganglia, from which ganglia afferent fibres, either motor, vaso-motor, or of other character, began, we might have some reason for elevating these ganglia, cords, and plexuses to the dignity of a "nervous system." According to Eulenburg and Guttmann, the sensory fibres of the heart and viscera are almost exclusively connected with the vagus. The sensory fibres for the abdominal viscera are, however, for the most part distributed by the sympathetic system. For the stomach only, the pneumogastric is to be regarded as a nerve of sensation. It is not at all improbable, even with regard to the stomach, that sympathetic branches from the solar plexus take part in the sensory innervation of the stomach. The sensory fibres of the intestines, according to Ludwig and Haffter, and Nasse, proceed from the splanchnic nerves. According to Budge the sensory or reflex nerves of the bladder and urethra emerge from the spinal cord with the third and fourth sacral nerves, and join the hypogastric plexus and lumbar part of the sympathetic. Irritation of the latter produces reflex contractions of the bladder, which do not appear after the third and fourth sacral nerves have been divided. Gianuzzi, also by irritating the branches passing from the sympathetic to the hypogastric plexus, obtained contractions of the bladder, occurring more slowly, and only after more powerful irritation than when the second, third, and fourth sacral nerves were operated on.

When speaking of sensory branches (acting reflexively) of the thoracic and abdominal sympathetic nerves, Eulenburg and Guttmann refer as follows to this question of the independence of the sympathetic.

> "In passing we shall here mention that formerly, when a greater degree of independent action was generally attributed to the sympathetic nervous system, even by eminent physiologists (Bidder, Volkmann), it was regarded as the centre not merely of motion, but also of sensations, for all the vegetative organs of the body. It is clear that at the present day we can no longer accept this view; and just as little importance can be attached to that of Küttner and Volkmann, regarding the possibility of a 'cross-conduction' (quer-leitung) by transference of sensory impressions from the sympathetic to cerebro-spinal fibres. We can now only regard it as possible that sensory filaments pass through the sympathetic to the cerebro-spinal system, notwithstanding that these cerebro-spinal offshoots, and the central terminations of the sensory fibres of the sympathetic (as, for instance, those contained in the splanchnic), are still to a great extent unknown to us."

In the second part, Eulenburg and Guttmann discuss a number of diseases which are certainly or probably connected with the sympathetic nervous system.

> "This connection may result—1st. From the presence of symptoms which resemble, or are identical with, those which we recognize as expressions of the physiological function of the sympathetic, and which we have enumerated and explained in the former part of this essay.
>
> "2dly. From pathological anatomical changes in the sympathetic nerve.
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> "Those conditions usually go together, but not invariably; thus, the pathological alterations may be completely wanting, or, on the other hand, they may

be found in cases which were not before suspected to have any connection with the sympathetic system."

The following affections are discussed: Functional disturbances in the domain of the cervical sympathetic, including (*a*) compression of the cervical sympathetic by tumours, (*b*) injuries to the cervical sympathetic, and (*c*) injury or disease of the cervical part of the spinal cord; unilateral hyperidrosis, hemicrania, glaucoma, neuroretinitis, ophthalmia neuroparalytica, progressive facial hemiatrophy, progressive muscular paralysis, exophthalmic goitre, angina pectoris, Addison's disease, diabetes mellitus; hyperæsthesias of the sympathetic system, including various forms of colic and neuralgia; anæsthesias of the sympathetic system; reflex paralysis, facial spasm, diphtheritic paralysis, progressive locomotor ataxia, epilepsy; pathological changes in the sympathetic in some infections and other diseases, as syphilis, leukæmia, pellagra, tuberculosis, cardiac disorders, and sunstroke.

Eleven pages are taken up with a consideration of cases of compression and of injuries to the cervical sympathetic, and of injury or disease of the cervical part of the spinal cord. Most of the cases bear out more or less fully the physiological observation, already discussed. The well-known case of gunshot wound of the right sympathetic, reported by Mitchell, Morehouse and Keen, is given in detail. The wars of Germany have furnished several new cases put on record by Kämpf, Seeligmüller, Bernhardt, and others.

Hutchinson made the important observation that cases of traumatic paralysis of the brachial plexus are usually associated with paralysis of the cervical sympathetic, which manifests itself by myosis, with loss of mobility of the pupil, by narrowing of the palpebral fissure, and by a rise in the temperature of the corresponding side of the face. Seeligmüller, who appears to have made a special study of cases of injury and disease of the cervical sympathetic, afterward confirmed Hutchinson's statements.

Cases of unilateral or localized sweating, or hyperidrosis, seem in some instances to be dependent upon true affections of sympathetic. Ebstein has recorded the case of a man who suffered from hyperidrosis of the left side which accompanied angina pectoris. Microscopic examination of the ganglia of the left sympathetic revealed the presence of extremely varicose and dilated vessels. Ebstein believes that these varicosities receive, at different times, a blood supply of varying amount. When the quantity is abnormally great, some of the sympathetic nerve elements must be temporarily compressed and so paralyzed.

Good reasons can be advanced for supposing at least some of the forms of migraine to be due to disease or disturbance of the cervical sympathetic. Du Bois Reymond, from a study of his own case, concluded that his migraine was caused by a tetanus of the muscular coat of the vessels on the affected side of the head, or, in other words, tetanus in the region supplied by the cervical part of the sympathetic nerve. He has proposed the name of *Hemicrania Sympathetico-tonica* for those cases resembling his own. Mollendorff has set up a theory of migraine the opposite of this. According to him, migraine is due to a unilateral *loss* of energy in the vaso-motor nerves governing the carotid artery, whereby the vessels are relaxed and permit an increased flow of arterial blood to the head. These cases, Eulenburg and Guttmann suggest, might be called *Hemicrania neuroparalytica* or *angio-paralytica*, as opposed to cases like that of Du Bois Reymond. Anæmia, in the one case, hyperæmia, in the other, is present. Caffeine, quinia, and ergot are particularly indicated in the neuro-paralytic or angio-paralytic cases of migraine, the remedies probably acting by increasing arterial tone, and thus decreasing the quantity of blood in the vessels of the brain. For the sympathetico-tonic variety, nitrite of amyl would seem to be indicated, acting by paralyzing the vaso-motor nervous system, and thus relieving the tetanic spasm. Drinking freely of warm water, and inhaling carbonic acid, act in a similar way to the nitrite of amyl. The constant galvanic current can be used in both forms, the method advised by Holst being probably the best. In hemicrania sympathetica-tonica the anode is placed over the cervical part of the sympathetic, the other electrode being held in the hand. In the neuro-paralytic form, the cathode is applied to the sympathetic.

The connection which exists between glaucoma, neuro-retinitis, and ophthalmia neuro-paralytica, and functional disorders in the domain of the cervical sympathetic, is imperfectly known. Some interesting cases and observations are, however recorded.

Brunner has lately recorded one striking case of unilateral atrophy of the face, which he believes pointed to a condition of permanent irritation of the cervical sympathetic. Usually this affection has been attributed to the vaso-motor nerves of nutrition included in the trigeminus.

In five cases of progressive muscular atrophy, positive changes of the sympathetic were found; but to these are opposed sixteen negative statements. The question as to the primary or secondary implication of the sympathetic remains to be decided.

With reference to pseudo-muscular hypertrophy, with the evidence before us, we incline to believe with Friedreich and Gowers that the affection is a primary disease of muscular tissue. Eulenburg and Gowers give a few interesting facts in regard to this disease.

If any disease, for physiological reasons, deserves to rank as an affection of the sympathetic nervous system, exophthalmic goitre would seem to have a claim to that distinction. Its three cardinal symptoms—palpitation of the heart, swelling of the thyroid gland, and protrusion of the eyeball—are all manifestations comparable or analogous to the effects produced by certain experiments performed upon the cervical ganglia or nerves, and to which we have already directed attention. The question of the influence of condition of the sympathetic nerves and ganglia in the production of Basedow's disease is very clearly and ably stated. The dilatation of bloodvessels and elevation of temperature, which follow division of the cervical sympathetic, both have their analogies in this affection. Strangely pulsating, tortuous, and prominent little arteries in the region supplied by the carotid, but especially in the swollen thyroid gland, are often present; Paul, Teissier, Cheadle, and Eulenburg and Guttmann, have observed a rise of temperature in a number of cases. Exophthalmos, it will be recalled, did not result from division of the cervical sympathetic, but only from electrical stimulation of the central end of the divided nerve. We have then in the disease two apparently contradictory conditions; but Eulenburg and Guttmann offer an ingenious and to a certain extent satisfactory explanation; namely, that the centre for the oculo-pupillary fibres of the cervical sympathetic (centrum cilio-spinale) is in a condition of irritation, while, on the contrary, the centre for the vaso-motor fibres is in a state of paralysis. For such a state of affairs we have many analogies in the pathology of the peripheral nervous system.

Eulenburg and Guttmann, however, conclude that we are not justified in regarding the exophthalmos of Basedow's disease as *entirely* due to a state of irritation in the sympathetic, because experiment indicates that every state of irritation in a nerve passes gradually into the opposite condition of paralysis. The extreme prolapsus found in the disease does not result from experimental irritation of the cut nerve. After a fair discussion of the question, they decide that it is extremely probable that three conditions—spasm of the unstriped orbital muscles, venous hyperæmia, and increase of the fatty tissue in the orbit—all co-operate in the production of exophthalmos.

A peculiar phenomenon to which v. Gräfe first directed attention indicates the participation of the sympathetic in the production of exophthalmic goitre. In health, the upper eyelid follows closely the movements of the eyeball; in exophthalmic goitre this consentaneous movement of the eyelid is wanting, the defect being due, according to v. Gräfe, to disturbed innervation of Müller's unstriped orbital muscles. To the same cause, v. Gräfe refers the inflammatory and ulcerative affections of the eye, which sometimes, but not often, are phenomena of the disease.

Dilatation of the pupil accompanies exophthalmos experimentally produced; in exophthalmic goitre it is always, or nearly always, absent. The only explanation offered is the statement that the pupillary fibres are not involved in this affection.

The palpitation of the heart they prefer to attribute, not to irritation but to paralysis of the cervical sympathetic.

> "The increased action of the heart may be interpreted as due to a variety of *paralysis* in the cervical sympathetic; paralysis of the cardiac sympathetic nerve fibres leads to dilatation of the cardiac vessels (the coronary arteries), and therefore to a greater flow of blood to the muscular tissue of the heart, and thus to stimulation of the cardiac ganglia."

The chapter on exophthalmic goitre is concluded by a brief description of the pathologico-anatomical changes found in thirteen cases of the disease. In nine of these changes were present; in four nothing abnormal was found. The changes almost uniformly found in the nine cases were increase of connective tissue and atrophy of nerve cells and nerve fibres.

A review of the physiological and pathological evidence leads us to the somewhat indefinite conclusion that the disease of Basedow and of Graves is sometimes a primary affection of sympathetic ganglia or nerves, but that, in many cases, these parts are only coincidently or secondarily involved.

Eulenburg and Guttmann, Chvostek and Meyer, claim to have obtained good results in exophthalmic goitre from galvanizing the sympathetic.

The following paragraph announces the standpoint from which Eulenburg and Guttmann discuss angina pectoris:—

> "The disease described by Heberden (1768) as Angina Pectoris, which is sometimes termed Stenocardia, is not an anatomically definable cardiac affection, but rather a group of symptoms, originating in very different, and for the most part unknown conditions. Although, therefore, we include a short account of it in this essay, we do not wish to indicate it as our belief that it is caused exclusively by changes in the sympathetic system, but that it seems to us that the latter, inasmuch as it takes the principal part in the formation of the cardiac plexus—which is almost certainly the starting-point of angina pectoris—is undoubtedly in some way connected with the occurrence of the phenomena under consideration."

The relation of symptoms to lesion, and what might be called the mechanism of the manifestations, in angina pectoris, are elaborately explained.

A theory has been advanced that Addison's disease is an affection of the nervous system, especially of the great abdominal plexuses of the sympathetic. A close relation exists between the nerves of the supra-renal capsules and these abdominal plexuses. The ganglion semilunare sends a considerable number of twigs to the supra-renal bodies, and these form a close network which is richly supplied with ganglia. Experimental physiology and pathological anatomy seem, however, on the whole opposed in regard to Addison's disease being an affection of the abdominal sympathetic. Eulenburg and Guttmann seldom produced the symptoms of Addison's disease by extirpating the abdominal plexuses in animals. They give details of twenty cases in which morbid changes were found in the sympathetic, and also of cases in which nothing was found.

In animals diabetes mellitus may be produced by wounding the floor of the fourth ventricle of the brain, by making incisions in the spinal marrow at various parts from the medulla oblongata downwards to the level of the lumbar vertebræ, and by injuring the cervical and upper thoracic ganglia of the sympathetic.

In regard to the question whether or not diabetes in man is in any way dependent on disease of the sympathetic nervous system, Eulenburg and Guttmann hold that this is the case in those forms which are analogous to diabetes in animals after injury to the central nervous system. Probably, also, they hold, that many forms of toxic diabetes (as by carbonic acid poisoning) and the rare forms of intermittent diabetes (the analogues of other intermittent neuroses) may be due to some other affection of the vaso-motor nerves.

The various forms of colic—lead, hysterical, menstrual, hemorrhoidal—and cardiac, cœliac, spermatic, urethral, and uterine neuralgias, have been described by Tanquerel des Planches and Romberg, as hyperæsthesias of the sympathetic. Eulenburg and Guttmann, in criticizing Romberg's attempt to include a large number of visceral diseases under hyperæsthesias of the sympathetic, show that this theory is clearly founded on the error that the essential element is disturbance of sensation, and that the motor phenomena are merely accidental or secondary. "Colic," they say, "is just as little a hyperæsthesia of the mesenteric plexus as angina pectoris is of the cardiac plexus; it is rather a compound sensori-motor neurosis."

They protest against the readiness with which the term "reflex action" is used in explaining any uncertain phenomenon in the domain of the sympathetic.

Anæsthesias have been erected into a special group, which is referred to by Eulenburg and Guttmann, but with them, we "cannot conceal our impression that every condition necessary to such a nosological arrangement is wanting."

The sympathetic has even had claimed for it an important *rôle* in the production of certain forms of motor disorder in the striped voluntary muscles. Paralyses occurring in connection with some affections of the intestines, and the urinary and sexual apparatus, have been ascribed to disease of the sympathetic by Willis, Whytt, Prochaska, Romberg, Remak, and others. Remak believed that all voluntary muscles were under a tonic influence proceeding from the sympathetic. Great, however, as may have been some of the work of Remak, it is impossible to accord any large degree of faith to his remarkable doctrines in regard to the sympathetic.

Duchenne believed that in a number of cases of locomotor ataxia, the cervical sympathetic must be regarded as the starting-point of the morbid processes, inferring this from the frequent occurrence of the oculo-pupillary symptoms. He supposed that the sympathetic was, in the first place, functionally affected. "He leaves quite unanswered the important question why we should not rather consider the pupillary, vaso-motor, and uro-genital centre situated in the spinal marrow as the points of origin of the functional anomalies connected with atrophy." Remak described a special form of tabes as *tabes sympathetica* (identical with the so-called hysterical tabes), which occurs almost exclusively in the female sex.

The angio-neurotic nature of epilepsy; the changes in the sympathetic in syphilis, and other constitutional diseases; and the state of the cervical sympathetic in persons dying suddenly from sunstroke, are subjects which receive brief attention from Eulenburg and Guttmann, and are worthy of further development at other hands.

The volume of Trumet de Fontarce is greater in bulk than that of Eulenburg and Guttmann; it is not, like the essay of the latter, based in part upon original experiments; and instead of the clear and condensed *resumé* of the subject presented by the German authors, we have a volume inflated to nearly four hundred pages by immense quotations and irrelevant matter. The manufacturing of bulky volumes, in which a neat rivulet of the author's text meanders through a meadow of quotations, is evidently not confined to American aspirants to medical fame.

The French author has managed to include a much larger number of affections in his positive classification than Eulenburg and Guttmann were willing to consider as having any connection, near or remote, with the sympathetic.

The essay of Eulenburg and Guttmann having been handed in for the Astley Cooper prize for 1877, in October, 1876, contains no references to papers since published. It is, however, up to the date mentioned, fairly overflowing with information from original sources. German authorities hold the most prominent place, but France, England, the United States, and other countries, have by no means been neglected. The book of Trumet de Fontarce contains some valuable recent references, but the author has drawn most largely from French text-books and treatises. The names of Lobstein, Poincaré, Jaccoud, and a few others, meet us at every turn. A rapid review of the contents of the book will serve to show its ambitious scope.

The first sixty-six pages are devoted to general considerations. A *resumé* is given of the anatomy, physiology, general pathological anatomy, and general pathological physiology of the sympathetic. From page 66, we have the special pathology of the great sympathetic, under which head the author discusses what he chooses to consider to be the diseases of the ganglionic system. The array of maladies is certainly sufficiently formidable. A glance through the book at the page headings gave us at first the idea that we had to deal with a new text-book of general medicine. We were mistaken, however; the author has not quite covered the whole field in his "sympathetic" classification.

The subdivisions of special pathology are six in number, as follows: Diseases of the peripheral ganglionic system, of the cerebral, cervical, thoracic, abdominal, and general sympathetic. A final chapter treats of fever in its relations with the great sympathetic.

Under diseases of the peripheral ganglionic system we have marshalled visceral neuralgias, vaso-motor neuroses, hyperæsthesias of various sympathetic plexuses; sympathetic anæsthesias, paralyses, and cramps; vaso-motor paralysis in hemiplegia, scleroderma, hemiglossitis, perforating disease of the foot, zona, the plague, sympathetic ophthalmia, glaucoma, œdema, progressive facial hemiatrophy, local asphyxia, and symmetrical gangrene of the extremities; trophic affections of the muscles, articulations, viscera, and hair; active neuroses or irritations of the ganglionic nerves concerned in the excitation of sweat; and, finally, to round off with, some diffuse ganglionic symptoms.

Diseases of the cerebral sympathetic constitute a modest class of a decidedly tentative character. We are informed that the few lines devoted to them are simply to prevent a gap in classification; precise clinical details are to be a conquest of the science of the future! To this we cordially agree.

Diseases of the cervical sympathetic include exophthalmic goitre, excessive sweating of the face, troubles of the facial circulation, and a timid reference to croup. We might quote the few lines in which he refers to croup, as they serve to show the cheerful willingness of our author to array every pathological process possible under his favourite banner:—

> "The memory remains with us of having read somewhere an opinion, of which we cannot recall exactly either the author or the source, which attributes to the intervention of ganglionic filaments the formation of the plastic products of croupous angina."

The thoracic sympathetic gives us nervous palpitations, spasm of the heart, arterial neuroses, capillary neuroses, spasmodic asthma, and angina pectoris.

Diseases of the abdominal sympathetic are made to embrace active neuroses, or irritations of the ganglionic plexus and nerves of the stomach, and by extension of the œsophagus and pharynx; of the plexus and nerves of the intestines, liver, spleen, pancreas, salivary glands, kidneys, and cœliac plexus, vegetable colic, migraine, peritonitis, nervous ileus or colic, saccharine and non-saccharine diabetes, and Addison's disease.

Strange bedfellows are these, and yet stranger still, perhaps, are those which are brought together under diseases of the general sympathetic: namely, cholera, progressive muscular atrophy, progressive muscular hypertrophy, glosso-labio-laryngeal paralysis, ephidrosis, hæmathidrosis, and chlorosis.

Under the head of fever in its relations with the great sympathetic after some generalities, he treats of a few of the most striking forms of malarial disease.

Under general pathological anatomy he reproduces four plates from the often-quoted work of Lobstein. Three of them represent inflammatory conditions of portions of the sympathetic; the fourth is a representation of the two splanchnic nerves and the solar plexus, on which are seen corpuscles of unknown nature, which have been met with several times post-mortem, in particular in a case of lead colic, and in one of catarrh of the stomach. In regard to these plates we will simply quote our author:—

"Without having a very precise value, they put in evidence the possibility of lesions which we are not in the habit of seeking."

The book is not altogether wanting in entertaining features.

In one of his long quotations from his favourite Poincaré we find the following passage:—

"Le sympathique n'échappe pas au traumatisme, particulièrement dans sa portion cervicale. Le cordon cervical fut blessé par une balle chez un soldat de la guerre de sécession dont l'observation a été publiée par Gunshot."

The reference evidently is to the case mentioned in "Gunshot Wounds and Other Injuries of Nerves," by Mitchell, Morehouse, and Keen. The expression "par Gunshot," is good, and reminds us of some ancient jokes on French translations of English poetry.

We will not go into a lengthy analysis of the contents of the work of Trumet de Fontarce. In our remarks on the essay of Eulenburg and Guttmann we have given the facts of most importance in regard to the physiology and pathology of the sympathetic. Outside of the discussion of the part played by the "great sympathetic" in causation, what has been written or compiled by Trumet de Fontarce about the many diseases considered in his book only has a special interest in cases of affections which are not usually included in the ordinary text-books. We are certainly under obligations to him for having collected into one volume a number of curious and valuable facts about some little known diseases. To a few of these—scleroderma, hemiglossitis, perforating disease of the foot, and local asphyxia and symmetrical gangrene of the extremities—we think it worth while to direct special attention.

In regard to the singular trophic affection of the skin, called scleroderma, Vidal (*L'Union Médicale*, March 11, 1879, p. 404) is chiefly quoted. Two interesting cases are described. In one, a young woman, the trouble began by a local asphyxia of the upper extremities with hyperhidrosis. Gradually the skin of the fingers and of the back of the hand became indurated; the finger ends atrophied. The nose and the cheek also became indurated, the skin pigmented. She experienced pains along the course of the vertebral column, and during several weeks a contracture of cerebral origin held the right arm and the fingers in flexion, a painful contracture, yielding to prolonged extension, as in the contractures of medullary origin. The second case was a man 67 years old, whose first symptoms were coldness and cyanosis of the hands, with excessive sweating of the palmar and plantar surfaces, this local transpiration contrasting strongly with the dryness of the rest of the skin. These symptoms became rapidly more pronounced and others appeared. Under the influence of grief or any emotion, the hands became cold, of a violet hue, their temperature lowering to 27° C. The phenomena gradually extended, gaining the arms, the thighs, and the trunk. They were accompanied by induration and pigmentation. At the time of making the report the scleroderma showed a tendency to become general, and the movements of the neck, of the trunk, and of the thighs were nearly prevented by the rigidity and retraction of the skin.

The pathogenic process, according to Vidal, is as follows: troubles of the vaso-motor nerves, local asphyxia, œdema consecutive to the disorder of circulation, and in the connective tissue chronic swelling, proliferation of fibrous and plastic elements. Vidal believes that the origin of the disease is a lesion of the anterior columns of the spinal cord. He refers to an observation of Chalvet and Luys, who in a case of generalized scleroderma, found sclerosis of the anterior columns of the cord.

Galvanism is advised as a treatment. Trumet de Fontarce refuses to allow the sympathetic to be robbed of the honour of originating this interesting affection, and resolutely attributes both the spinal sclerosis and the hardening of the skin to a vaso-motor disturbance in the domain of the sympathetic. Fouget considers scleroderma a true inflammation of the chorion.

Attention has been recently especially directed to hemiglossitis, or inflammation of one-half of the tongue, by Noel Guéneau de Mussy (*Arch. Gén. de Méd.*, April, 1879). He gives an account of two men, one aged 80, and the other 25 years, who, following a superficial inflammation of the throat and respiratory tract, were attacked with severe glossitis. The left half of the tongue was the chief seat of the swelling, which nearly trebled the volume of the organ. Speech was embarrassed, swallowing painful, salivation abundant, etc. The congestion of the tongue had been preceded during several days by sharp pains in the corresponding side of the head in one case, in the same side of the head and in the ear in the other; and in both these symptoms were accompanied by lancinating pains and hyperæsthesia of the left side of the tongue. The disease is rare. Dechambre and Graves mention several cases. In all of these, as in the two of Guéneau de Mussy, the seat of the affection was the *left* half of the tongue. Guéneau de Mussy believes that the influence of the nervous system can alone explain the phenomena of the disease, as among the anatomical elements of the tongue the nerves only remain independent and distinct in each half of the organ. He refers the morbid action to the sphere of the lingual and chorda tympani nerves. Trumet de Fontarce points to the necessary intervention in such cases of the vaso-motor nerves, and to the implication of the sympathetic through its relations with the chorda tympani nerve and salivary glands.

Perforating disease of the foot (*mal perforant du pied*) is a rare and interesting affection of which a fair account is given. It may be considered, we are told, a trophic alteration connected with a lesion of the vaso-motor nerves of the parts diseased. It has received the attention of Vulpian, and has been particularly studied by Duplay and Morat (*Arch. Gén. de Méd.*, March, April, and May, 1873). In brief, the disease is an ulcerative process which is commonly preceded by the formation of a callosity on the plantar face of the foot. The ulcer is chronic; little by little it gains the deep parts; the articulations and even the bones may be finally invaded, often necessitating partial amputations. Diminution, or even abolition of sensibility at and near the ulceration is usually observed. It is a mixture of anæsthesia proper and analgesia or loss of the pain-sense. The epidermis becomes notably thickened, sometimes over the whole plantar surface. The dorsal surface is sometimes covered with thick scales. In most cases the nails become thickened, yellowish, rough, cracked, and recurved. The skin assumes a brownish colour. The secretion of sweat is generally more abundant and fetid, although, at times, it is diminished or even suppressed. The subcutaneous cellular tissue becomes hardened. Sometimes anchyloses of the articulations of the foot occur, at other times subluxations and deformities are produced. Cutaneous eruptions, inflammatory œdema and swelling, and limited gangrene are among the complications.

Very definite anatomical lesions of the skin, vessels, papillæ, sudoriparous glands, bones, articulations, tendons, muscles, and nerves are produced, and have been studied. The nerves are said to present two distinct lesions: (1) A degeneration of the nerve tubes; and (2) an inflammation of the connective tissue of the nerves.

Duplay and Morat regard degeneration of the nervous elements as the principal cause of the plantar ulceration. They cite two observations, in one of which a perforating ulcer formed after wounding of the sciatic nerve by a ball, and in another the same lesion occurred secondarily from compression of the sciatic at its origin by a cyst of the sacrum. They look upon the spinal ganglia as among the parts capable of determining this vice of nutrition; but they also believe that the ulceration can be caused by certain lesions of the cord, by section or compression of the great nerve trunks, or by alterations of the nerve extremities. According to our author, the ganglionic system ought to occupy a chief role in causation, because of the habitual association of the sympathetic filaments with the divisions of the spinal axis.

Treatment, so far, has been confined simply to attacking symptoms and combating directly the ulceration.

Local asphyxia and symmetrical gangrene of the extremities is an affection to which attention was first specifically called by Maurice Raynaud in 1862. De Fontarce quotes Poincaré and Raynaud. Within the last two years several interesting articles on this subject, but under different titles, have appeared in our American journals. In the issue of this journal for October, 1878, under the title of "Vaso-motor and Trophic Affection of the Fingers," we published a detailed account of a case which represented one of the forms of local asphyxia. Dr. J. Collins Warren (*Boston Medical and Surgical Journal*, January 16, 1879) has published a good paper on "Symmetrical Gangrene of the Extremities," in which the whole subject is well discussed, and all the important references are given.

The disease in one of its most usual forms attacks the extremities of both of the upper or both of the lower limbs; sometimes all four extremities are attacked at the same time. The pulps of the fingers and toes become cold and pale; in later attacks they become of a blue or purplish color; gangrenous patches or abscesses form. Sometimes the ears and nose may be affected, but these parts are not usually attacked with gangrene. Severe pain is often present. The disease is most apt to occur in young women.

Raynaud, Vulpian, Fischer, and others hold that in this affection we have a true spasm of the vessels of the extremities. Raynaud inclines to believe in the spinal origin of the disease. Warren shows very satisfactorily how the affection may be due to a central irritation in the cord, at the point from which the vaso-motors of the regions affected are derived. De Fontarce, however, must, of course, believe that interpretation most legitimate which makes a vice of innervation of the sympathetic to be the cause.

The final chapter on fever in its relations with the great sympathetic, to which we turned with the hope—a faint hope, it is true—of obtaining some new light on one of the greatest of pathological subjects, proved to be sadly disappointing. He throws aside with a simple assertion the theories of heat-producing and heat-regulating centres in the central nervous system. Although so fond of calling upon authority, we find no references here to such investigations as those of Heidenhain on the effect in temperature of irritation of sensitive nerves; of Tcheschichin, on the influence of section of the cord and of the medulla oblongata; of Heidenhain, Dittmar, Owsjannikow, and H. C. Wood, on the existence of a chief vaso-motor centre in the medulla oblongata; of Wood, on the presence in the pons or above it, of a centre whose function it is to inhibit or repress the chemical movements of the body, *i. e.*, the production of animal heat; of

Eulenburg and Landois, and of Hitzig, on the presence in the cerebral cortex of heat-controlling centres.

Jaccoud, Poincaré, Bernard, Vulpian, Mantegazza, and Lobstein, are quoted, but none of those to whom we have just referred.

The views of Trumet de Fontarce on the pathogeny of fever may be summarized as follows :—

The grand sympathetic has the first *rôle* in pathogeny of fever. It can enter into action primarily, or its influence may be exerted secondarily. In the latter case, the nervous system of the animal life is first involved, and transmits the impulse to the ganglionic system by the normal anatomical channels.

Analysis of the facts presented in the two works before us affords no evidence that the sympathetic is independent of the cerebro-spinal axis. No portion of the nervous system is absolutely independent—"all are but parts of one stupendous whole." Bouillaud, quoted by Trumet de Fontarce, speaks of the sympathetic system as holding under its empire all involuntary movements. This may be poetical, but it is not true. The brain alone has imperial sway. The sympathetic ganglia and plexuses doubtless act in some way as local centres of force; but they are not centres in the same sense as psycho-motor areas of the cerebral cortex. They are themselves usually under the control of the cerebro-spinal system. They may by habit acquire a certain amount of automatism, acting sometimes as independent reflex centres.

According to Kesteven the sympathetic ganglia derive their power of action from the cerebro-spinal system by means of the rami communicantes. "It is, however, one of the functions of all nerve corpuscles to cause modifications of the impressions brought to them. The peculiar modification which the nerve corpuscles of the sympathetic cause in the electro-nervous force thus derived from the higher or more specially developed cerebro-spinal system, consists in enabling that force to act upon the involuntary muscular fibres throughout the body" (*Brain*, October, 1878). We quote these remarks from Kesteven, because of their suggestive value. We are not prepared to give adherence to his opinions in regard to vaso-motor centres. He adopts the views of Dr. Radcliffe, which have always had for us a certain charm, that nerve and muscle when at rest are in a state of charge, analogous to that of a Leyden jar. Action is discharge; or, in other words, muscular contractions, and other phenomena accompany a sort of discharge.

The investigations of recent years would seem to show that we have at different levels in the nervous system, different sets of centres concerned with the same functions—centres in the cerebral convolutions, in the pons and medulla oblongata, in the spinal cord, in the sympathetic ganglia, and even perhaps, in the peripheral nerves. Nervous impulses may be, and probably are, transmitted by a species of discharge taking place between these stations.

The peripheral ramifications of the nervous system are so numerous that it is a physical impossibility to have an absolute continuation of its multitudinous filaments through the narrow spinal axis. The posterior spinal ganglia may have for a part of their function the conversion of afferent impressions into such form that they may be transmitted upwards through the cord; while the sympathetic ganglia are concerned in radiating, and, at the same time, harmonizing vaso-motor and other impulses sent down from the brain.

We have no warrant in ascertained facts for any nosological arrangement, such as that of Trumet de Fontarce, which would dogmatically include under diseases of the sympathetic any considerable number of affections. Elaborate classifications into diseases of various divisions of the sympathetic should be discarded. No one, of course, calls in question the fact that the various sympathetic nerve elements may sometimes be attacked by disease. These filaments and ganglia may be the seat of sclerosis or fatty degeneration, may be cut, crushed, or compressed—may, in short, be affected by various pathological processes, as may cerebro-spinal nerves, the cord, or the brain. If experiment and pathological observation have determined that a uniform set of symptoms follows disease or injury of a certain part of the sympathetic, and that these manifestations are not produced by lesions elsewhere, we may speak of these conditions as disorders of the sympathetic without any violation of truth or propriety. The same or similar symptoms, however, are often caused by lesions situated in different parts of the nervous system. Lesions of the sympathetic are also often secondary to disease in other parts. To have a classification founded upon pathological anatomy that shall be of any practical value, we should have fair evidence that the lesions on which the classification is based are primary. For many nervous diseases a good clinical or semeiological classification is, in the present state of our knowledge, the best for the purposes of teaching and practice.

In concluding this review, we desire briefly to call attention to the ablest of recent contributions to the pathology of the sympathetic system of nerves, an elaborate paper by J. M. Da Costa, M.D., and Morris Longstreth, M.D., entitled *Researches on the State of the Ganglionic Centres in Bright's Disease*, in the *American Journal of the Medical Sciences* for July, 1880. These observers give the details of an elaborate study of series of cases arranged in different groups according to the prominence of the changes found. The results of carefully conducted microscopical examinations both of the kidneys and of the renal ganglia are recorded. We will not go into an analysis of the paper, deeming it unnecessary, as it appeared in the last number of this Journal. Their conclusions were as follows:—

"1st. That in Bright's disease, especially in the contracting kidney, there exists a constant lesion of the renal plexus.

"2d. That, whilst this lesion might be looked upon as forming part of a general process of degeneration in connection with the kidney disease, we think it is the cause of the renal malady and precedes the degenerative changes.

"3d. That the diseased condition of the ganglia furnishes the clue to the alterations of the vessels of the kidneys.

"4th. That similar changes producing similar results may exist in other ganglia, for instance, in the cardiac plexus, explaining the hypertrophy of the heart."

Believing as we do in the inter-communication and inter-dependence of the cerebro-spinal and ganglionic "systems," the question of the causative relations of lesions of the sympathetic ganglia to disease of the kidneys or other organs cannot, we think, be positively decided without an investigation, in the cases studied, of the rami communicantes and spinal cord, and, perhaps, also of the brain. Nevertheless, the research of Drs. Da Costa and Longstreth is an original and valuable contribution to pathology.

C. K. M.